

Summary of hollow-beam collimation studies in TEL2

G. Stancari, A. Valishev

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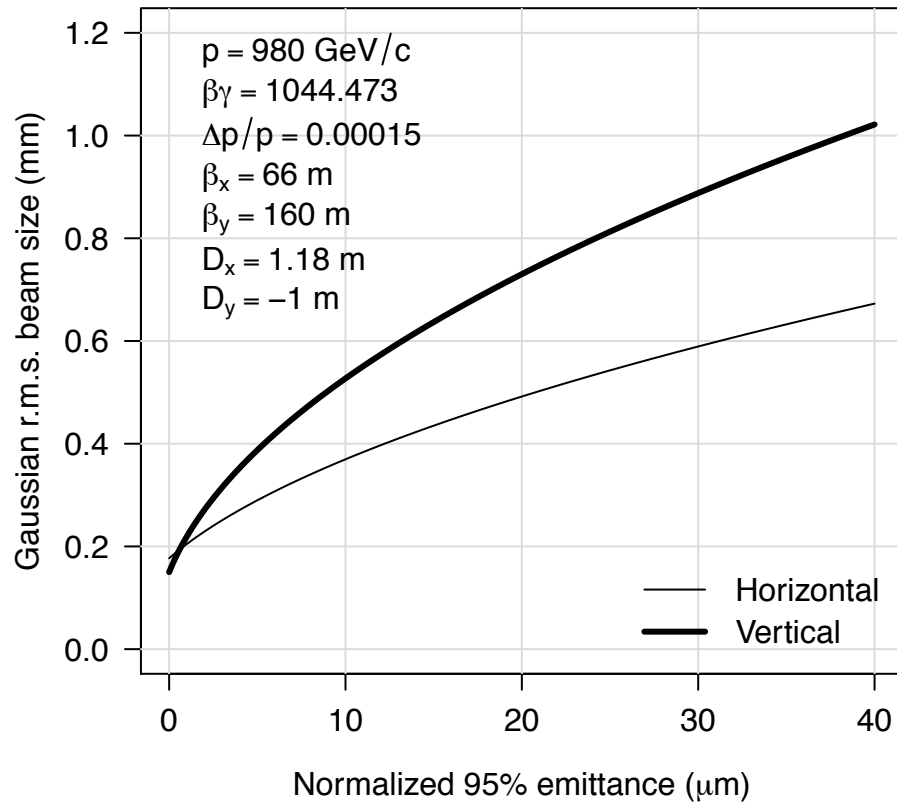
Some experimental questions addressed by the hollow-beam collimation project:

- ➡ Can measurements be made parasitically?
- ➡ What is the effect on bunch losses, lifetimes, emittances, luminosity?
- ➡ Does the collimation efficiency increase?

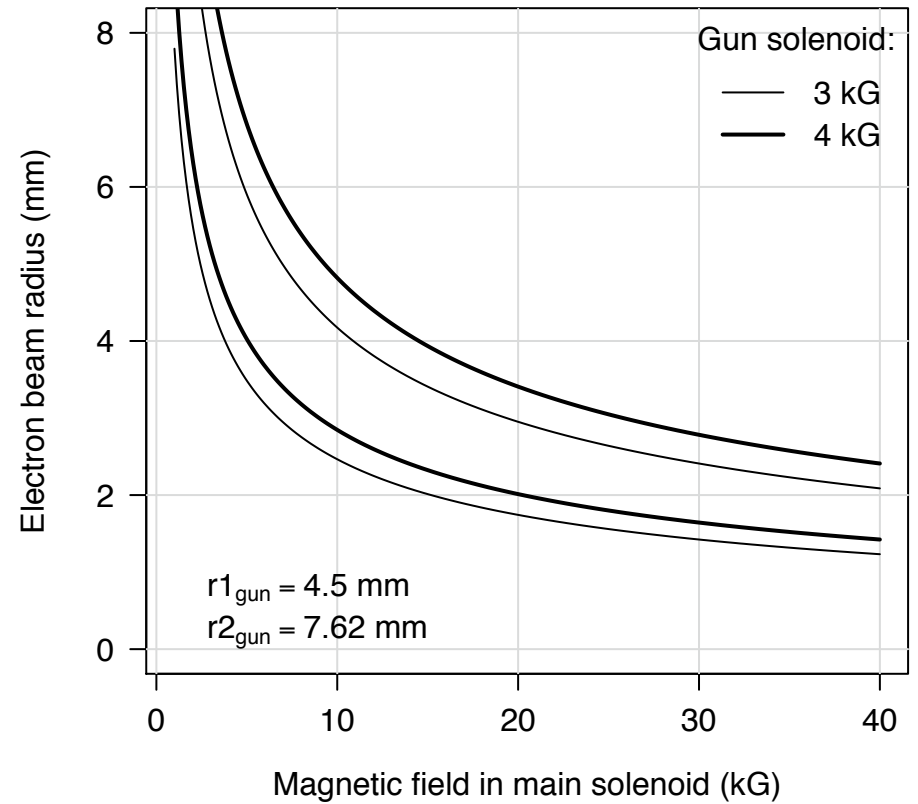
First 3-hour EOS study Wed Oct 13 (store #8171)

Calculated beam sizes

(Anti)proton beam sizes at TEL2 vs. emittance

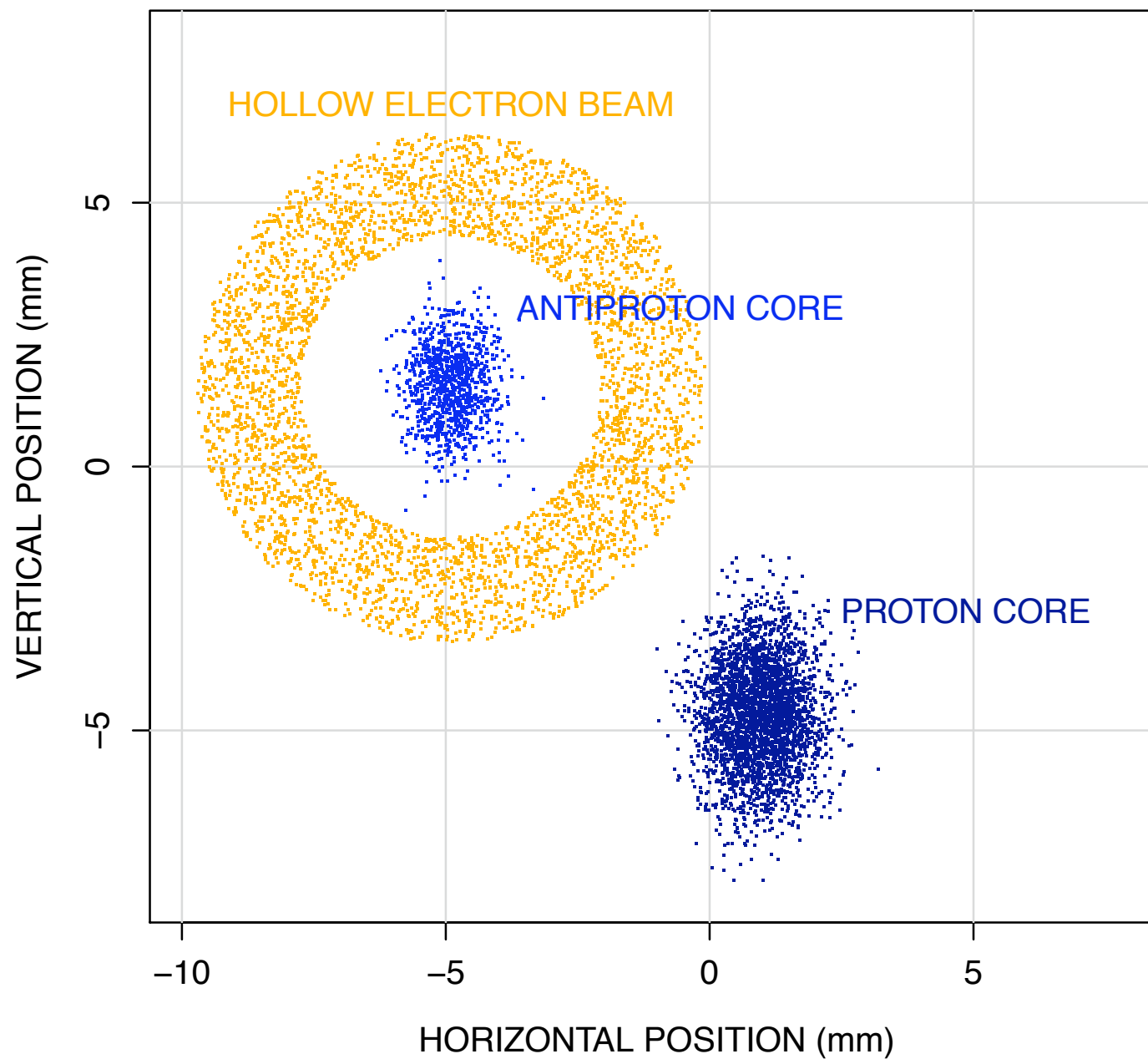


0.6-in hollow-gun electron beam sizes vs. magnetic field

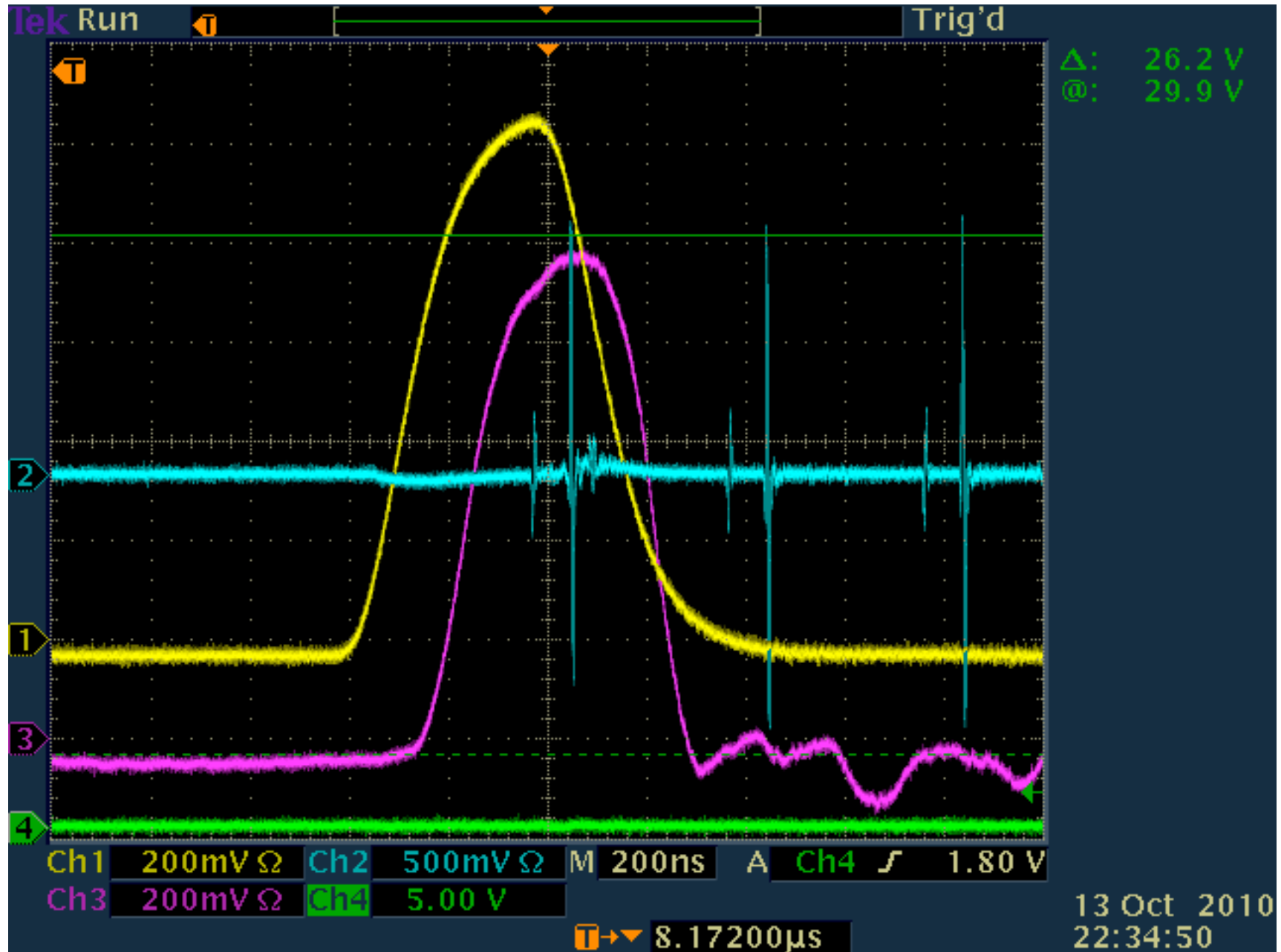


Worked with pbar bunches A13 and A25

Hollow-beam collimation concept at TEL2 location in Tevatron

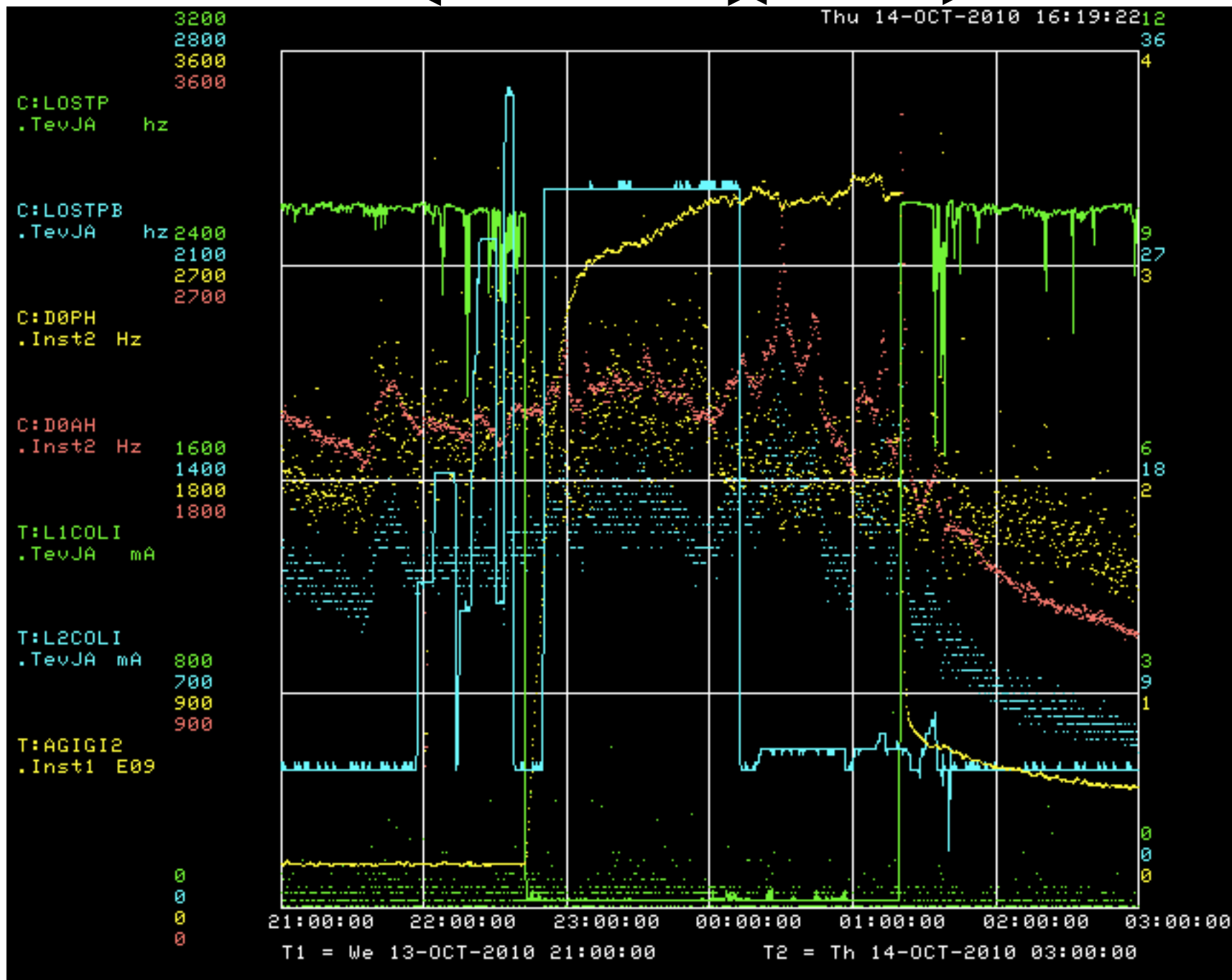


TEL2 timing

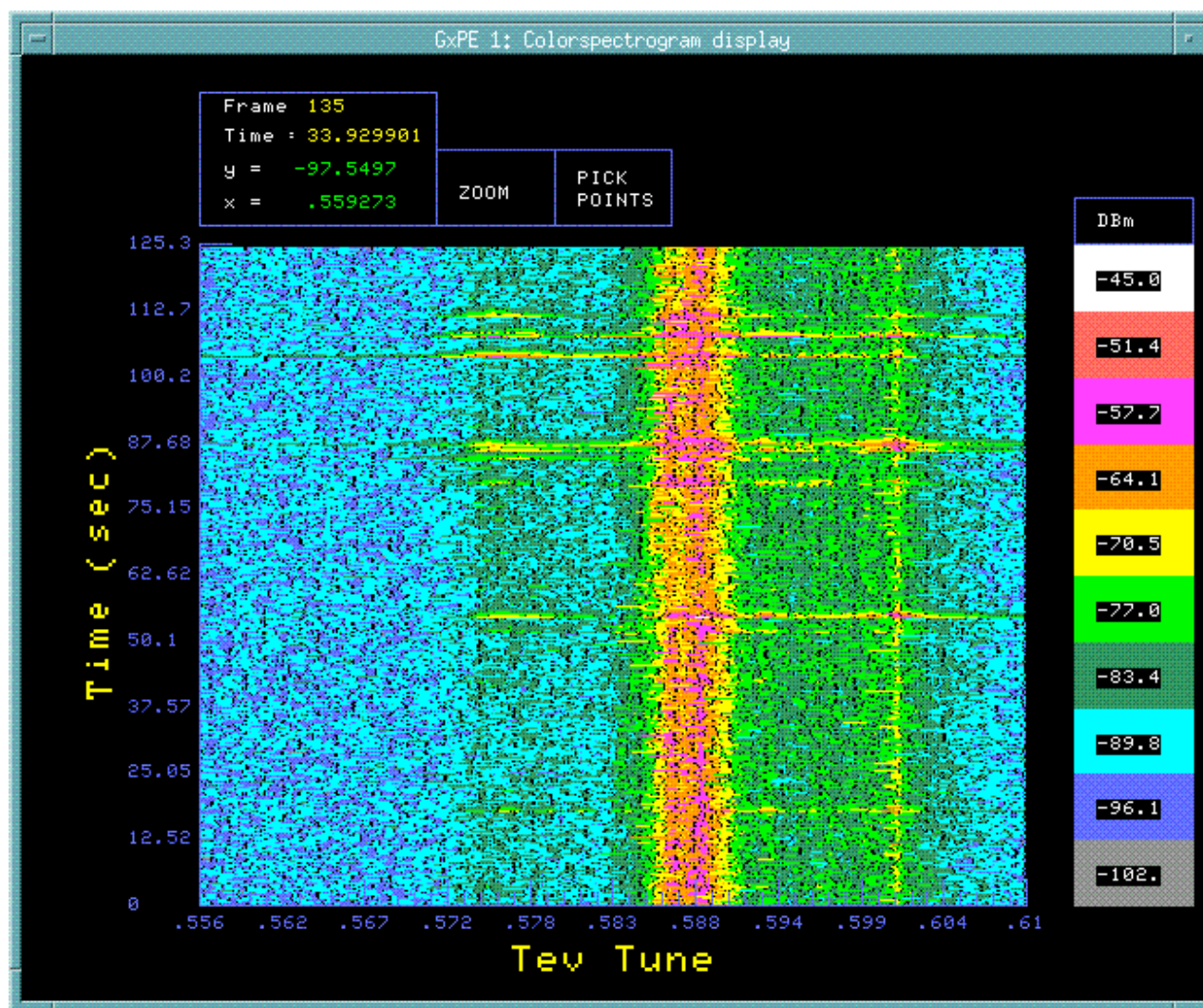


Position / angle scans varying e-beam size / timing

TEL2 pulsing: \longleftrightarrow every turn \longleftrightarrow every 6th turn

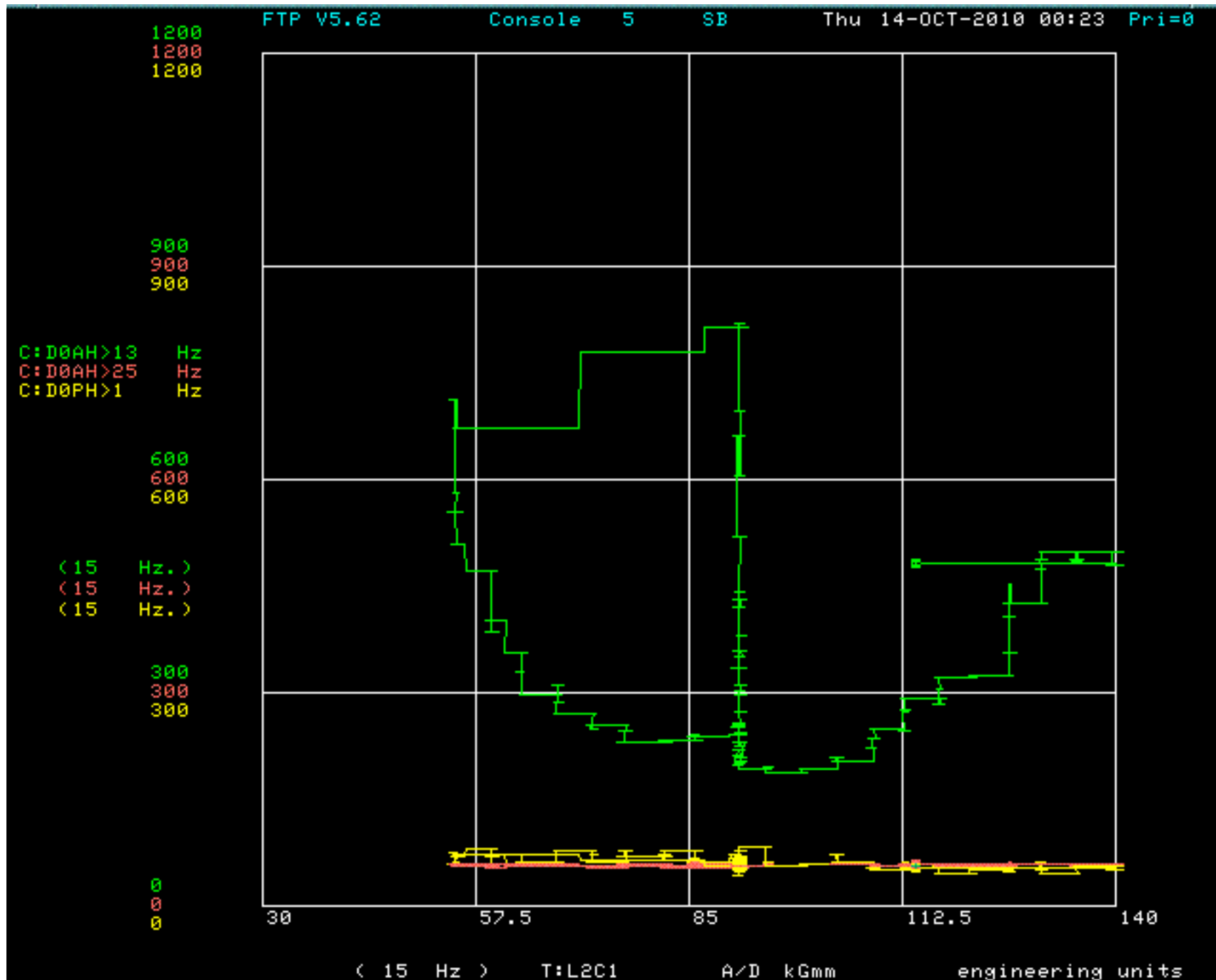


Observed unusual pattern on Schottky. Initially attributed to TEL1 instability.

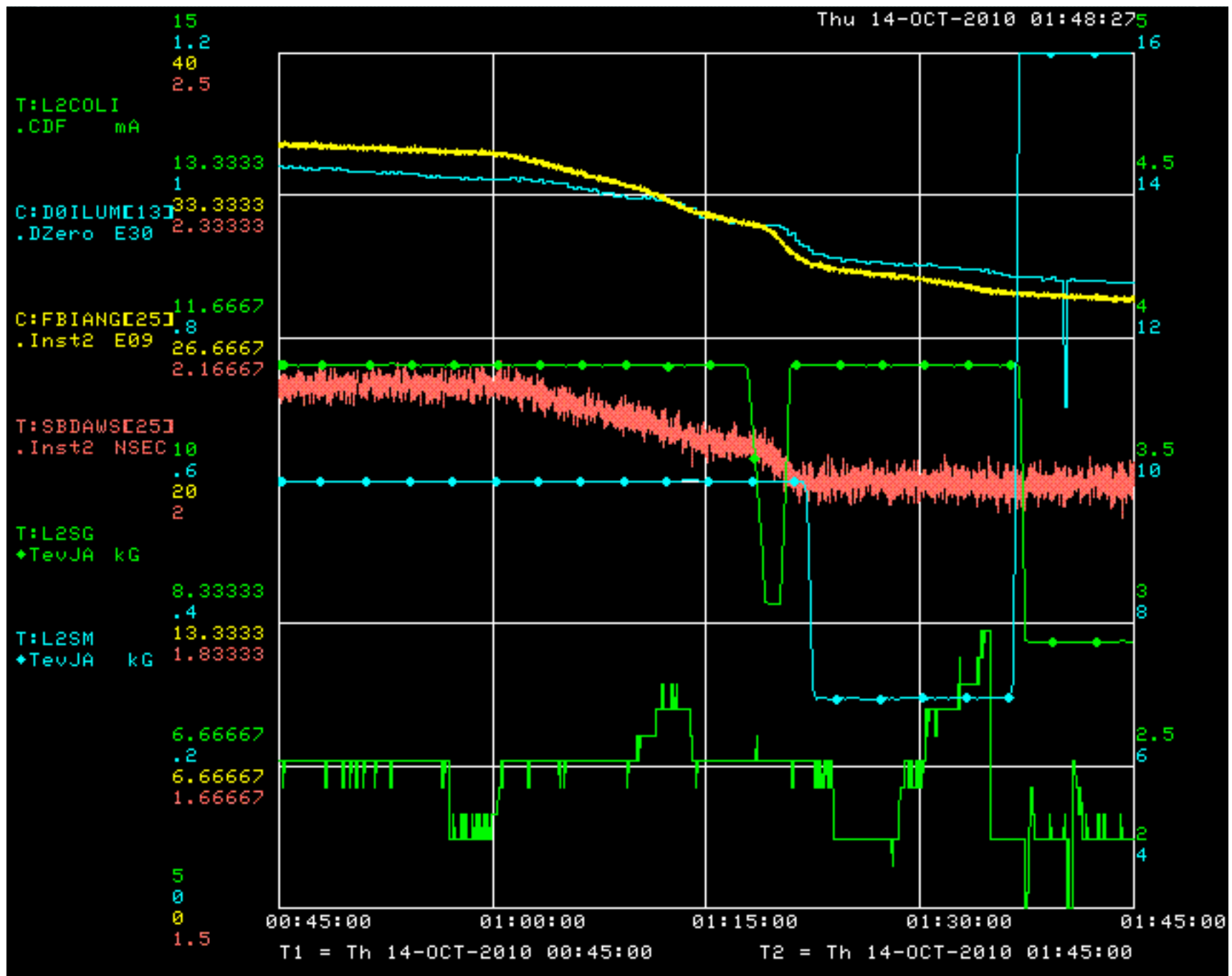


Turned off both TEL1 and TEL2. The problem persisted and seemed unrelated to the electron lenses.

Example of angle scan on A13



Effect on A25 for different ebeam sizes



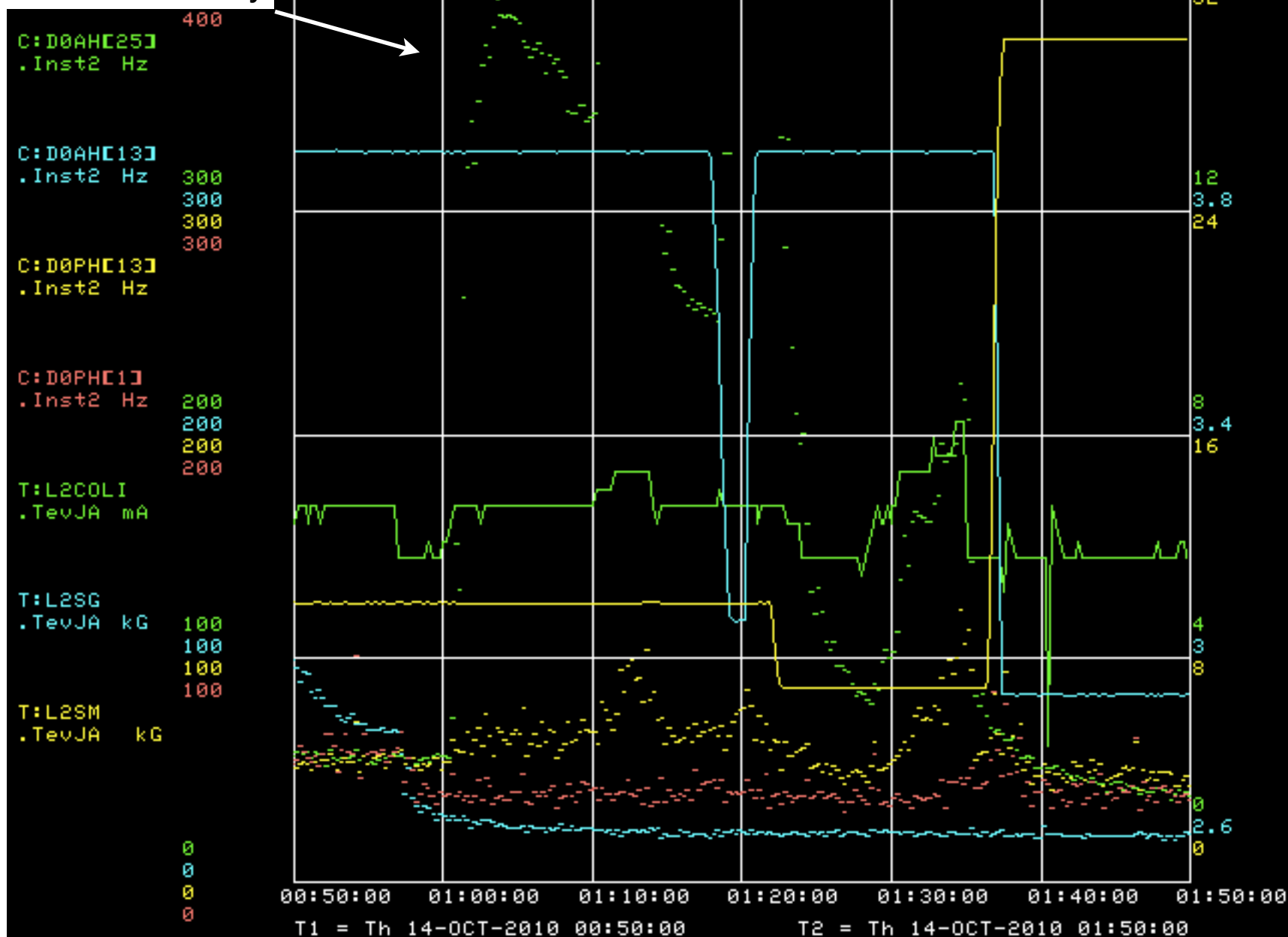
Losses vs. ebeam size

loss dynamics
related to efficiency

4-10-4 kG "4 σ "

4-7-4 kG "5 σ "

19:09:32



Summary

- ▶ Performed position/angle scans to confirm e/pbar alignment with TEL2 BPMs
- ▶ With aligned hollow e-beam, C:D0AH[bunch] increase was a few 100 Hz (less for larger hole sizes) — no significant increase in losses in other proton/pbar bunches
- ▶ Preliminary measurements of lifetimes, emittances, luminosities vs. e-lens settings (data being analyzed): found good operating conditions (pulsed, 4-7-4 kG), to be confirmed during next study
- ▶ With small electron hole, observed that scraping is mostly longitudinal
- ▶ Increase in abort-gap intensity caused by intentional TEL1 turn off (to investigate Schottky spikes)